Patent Claims

1. A method for transporting electrically charged molecules in an aqueous solution, in particular during the operation of a DNA sensor with a redox cycling process between two measuring electrodes, characterized by the following measures:

- in the vicinity of the measuring electrodes, a metallic material which is resistant in the aqueous electrolyte and is more electronegative than that of the measuring electrode is arranged as an electrode to which a potential can be applied,
- as a result of a positive potential being applied to the electrode, the metallic material is brought into solution as positive ions,
- whereby negatively charged molecules are transported as target molecules in the opposite direction and are enriched at the measuring electrodes.

2. The method as claimed in claim 1, characterized in that the metal ions going into solution are complexed by the presence of a complexing agent, whereby their concentration is kept low and virtually constant.

3. The method as claimed in claim 1 or 2, characterized in that copper is used as the metallic material, said copper forming a copper sacrificial anode.

4. The method as claimed in claims 2 and 3, characterized in that histidine is used as a complexing agent for complexing the copper ion.

5. The method as claimed in one of claims 1 to 4, characterized in that catcher molecules at an electrode

surface are used for detecting the target molecules.

6. The method as claimed in claim 5, characterized in that thiol-modified capture molecules are used as capture molecules.

7. The method as claimed in claim 5, characterized in that hydrogel-bound molecules are used as capture molecules.

8. The method as claimed in one of the preceding claims, characterized in that an electrophoresis method is performed.

9. The method as claimed in one of the preceding claims, characterized in that a DNA analysis of DNA fragments is effected.

10. The method as claimed in claim 9, characterized in that the enriched molecules are detected as target molecules during the DNA analysis.

11. The method as claimed in claim 8 or 9, characterized in that the selectivity of the process is increased by polarization of the electrodes used for the electrophoresis or DNA analysis.

12. A method for binding-specific separation of electrically charged molecules in an aqueous solution, in particular during the operation of a DNA sensor with a redox cycling process between two measuring electrodes, characterized by the following measures:

- metal ions are situated in the aqueous solution,
- as a result of a negative potential being applied to the measuring electrodes, the metal ion is deposited as metal at the measuring electrodes,
- whereby negatively charged molecules bound in the vicinity of the measuring electrodes are transported away from the measuring electrodes

as target molecules with a sufficiently low binding energy.

13. The method as claimed in claim 12, characterized in that copper is used as metal ions and gold is used as measuring electrodes.

14. The method as claimed in claim 12, characterized in that the molecules transported away from the measuring electrodes are those target molecules which are not intended to be detected during the DNA analysis.

15. A device for carrying out the method as claimed in claim 1 or one of claims 2 to 10, or for carrying out the method as claimed in claim 12 or one of claims 13, 14, having an arrangement comprising measuring electrodes (20, 30) for electrochemical measurement in an aqueous solution (15), there being present in the aqueous solution metal ions or accumulations (40) of metal made of more electronegative material than that of the measuring electrodes (20, 30), the material being resistant in aqueous solution (15).

16. The device as claimed in claim 15, characterized in that the measuring electrodes (20, 30) comprise noble metal, in particular gold.

17. The device as claimed in claim 15, characterized in that the metal is copper and forms a sacrificial electrode (40).

18. The device as claimed in claim 16, characterized in that the measuring electrodes made of gold have a sensor surface (21, 31) to which capture molecules for the target DNA (200) are bound.

19. The device as claimed in one of claims 15, 16 or 18, characterized in that the

measuring electrodes (20, 30) form an interdigital structure comprising comb electrodes (82, 83) with intermeshing electrode fingers.

20. The device as claimed in claim 17, characterized in that the sacrificial electrode (84) is arranged annularly around the comb electrodes (82, 83).

21. The device as claimed in claim 15, characterized in that a hydrogel layer (35) for binding the capture molecules (100) is arranged on the measuring electrodes (20, 30).

22. The device as claimed in claim 15, characterized in that the measuring electrodes (20, 30) are assigned separate reaction areas (30) for attachment of the capture molecules (100).

23. The device as claimed in claim 19, characterized in that an array (80) having m rows and n columns is formed by individual interdigital structures (80, 80', ...) with sacrificial electrode (84).

24. The device as claimed in claim 23, characterized in that an auxiliary electrode (185) with respect to the individual sacrificial electrodes (84) runs annularly around the m·n array (180).